main

November 17, 2022

[ ]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from matplotlib.pyplot import figure
import seaborn as sns
# import opendatasets as od
import os
from zipfile import ZipFile

from plotly.subplots import make_subplots
import plotly.graph_objects as go


import plotly.express as px

%matplotlib inline
```

[ ]:
```
walmart = pd.read_csv('./train.csv')
stores = pd.read_csv('./store.csv')
features = pd.read_csv('./features.csv')
# testing = pd.read_csv('./test.csv')

stores.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 45 entries, 0 to 44
Data columns (total 4 columns):
 #   Column  Non-Null Count  Dtype 
---  ------  --------------  ----- 
 0   Store   45 non-null     int64 
 1   Type    45 non-null     object
 2   Size    45 non-null     int64 
 3   DMA     45 non-null     object
dtypes: int64(2), object(2)
memory usage: 1.5+ KB
```

[ ]:
```
features.drop(columns = ['MarkDown1', 'MarkDown2', 'MarkDown3', 'MarkDown4',␣
↪'MarkDown5'], inplace = True)
```

Removing our NULL/NA values from our dataframes prior to merging our 3 datasets into a single larger dataset

[ ]:
```
merged = walmart.merge(stores, how='left').merge(features, how='left')
# testing_merged = testing.merge(stores, how='left').merge(features, how='left')
```

[ ]:
```
def split_date(df):
    df['Date'] = pd.to_datetime(df['Date'])
    df['Year'] = df.Date.dt.year
    df['Month'] = df.Date.dt.month
    df['Day'] = df.Date.dt.day
    df['WeekOfYear'] = (df.Date.dt.isocalendar().week)*1.0

split_date(merged)
```

```
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c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '25/05/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '15/06/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '22/06/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
```

```
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '29/06/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '13/07/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '20/07/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '27/07/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '17/08/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '24/08/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '31/08/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '14/09/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '21/09/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '28/09/2012'
```

```
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '19/10/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
c:\Users\arman\anaconda3\envs\AML\lib\site-
packages\pandas\core\tools\datetimes.py:1047: UserWarning: Parsing '26/10/2012'
in DD/MM/YYYY format. Provide format or specify infer_datetime_format=True for
consistent parsing.
  cache_array = _maybe_cache(arg, format, cache, convert_listlike)
```

[ ]:
```
merged.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 421570 entries, 0 to 421569
Data columns (total 16 columns):
 #   Column        Non-Null Count   Dtype
---  ------        --------------   -----
 0   Store         421570 non-null  int64
 1   Dept          421570 non-null  int64
 2   Date          421570 non-null  datetime64[ns]
 3   Weekly_Sales  421570 non-null  float64
 4   IsHoliday     421570 non-null  bool
 5   Type          421570 non-null  object
 6   Size          421570 non-null  int64
 7   DMA           421570 non-null  object
 8   Temperature   265245 non-null  float64
 9   Fuel_Price    265245 non-null  float64
 10  CPI           265245 non-null  float64
 11  Unemployment  265245 non-null  float64
 12  Year          421570 non-null  int64
 13  Month         421570 non-null  int64
 14  Day           421570 non-null  int64
 15  WeekOfYear    421570 non-null  Float64
dtypes: Float64(1), bool(1), datetime64[ns](1), float64(5), int64(6), object(2)
memory usage: 52.3+ MB
```

Our first goal is to visualize the data that groups sales by the DMA. We will do so to create some baseline understanding of what each locations total sales look like.

[ ]:
```
merged_subsample = merged.sample(n = 100000, random_state = 42)
```

[ ]:
```
count = merged['DMA'].value_counts()
print(count)
```

```
count2 = stores['DMA'].value_counts()
[print(count2)]
```

```
Los Angeles                          64446
Cleveland-Akron                      40539
Houston                              40429
Dallas-Ft.Worth                      38463
Atlanta                              34026
Denver                               29139
Chicago                              29038
Austin                               25733
Philadelphia                         20198
Charlotte                            19881
Tampa-St. Pete                       19851
Kansas City                          17166
San Diego                            16646
Salt Lake City                       15804
Oralando-Daytona Brach-Melbourne FL  10211
Name: DMA, dtype: int64
Los Angeles                          7
Dallas-Ft.Worth                      4
Houston                              4
Atlanta                              4
Cleveland-Akron                      4
Denver                               3
Chicago                              3
Austin                               3
Philadelphia                         2
Tampa-St. Pete                       2
Charlotte                            2
San Diego                            2
Salt Lake City                       2
Kansas City                          2
Oralando-Daytona Brach-Melbourne FL  1
Name: DMA, dtype: int64
```

[ ]:
```
[None]
```

[ ]:
```
DMAsales = merged.groupby(['DMA', 'Year'])['Weekly_Sales'].mean().reset_index()

fig = px.bar(DMAsales, x='DMA', y='Weekly_Sales', labels= {'DMA':'DMA␣
 ↪Location', 'Weekly_Sales':'Average Weekly Sales'}, title = "Average Weekly␣
 ↪Sales by DMA")
fig.update_traces(textposition='inside', text = DMAsales['Year']) #␣
 ↪round(DMAsales['Weekly_Sales']/1000, 2)) # , round(DMAsales['Weekly_Sales']/
 ↪1000, 2))
fig.show()
```

[ ]:
```
DMAsales = merged.groupby('DMA')['Weekly_Sales'].mean().reset_index()

fig = px.bar(DMAsales, x='DMA', y='Weekly_Sales', labels= {'DMA':'DMA␣
 ↪Location', 'Weekly_Sales':'Average Weekly Sales'}, title = "Average Weekly␣
 ↪Sales by DMA")
fig.update_traces(textposition='inside', text = round(DMAsales['Weekly_Sales']/
 ↪1000, 2))
fig.show()
```

We can see that Houston, Orlando, and Tampa have the 3 highest average sales out of our given locations

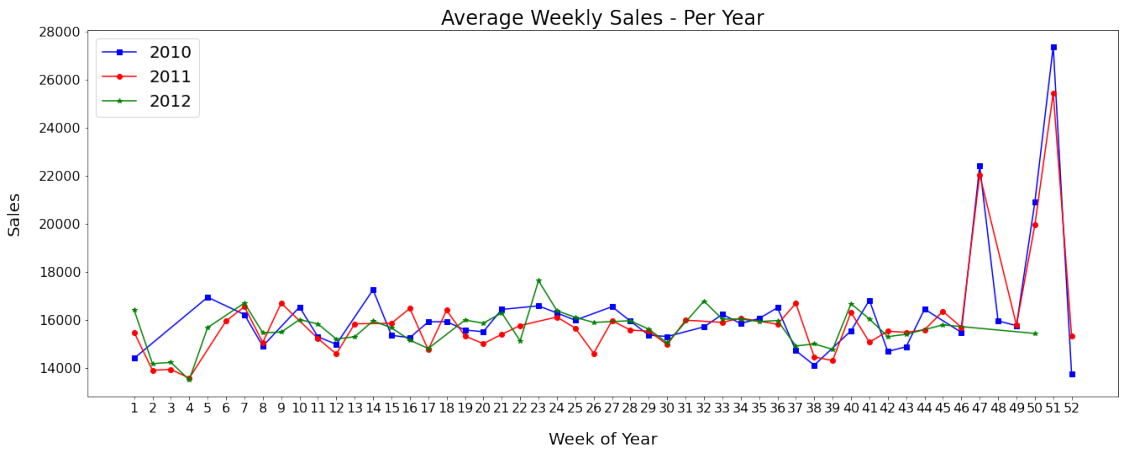
[ ]:
```
weekly_sales_2010 = merged[merged.Year==2010].
 ↪groupby('WeekOfYear')['Weekly_Sales'].mean()
weekly_sales_2011 = merged[merged.Year==2011].
 ↪groupby('WeekOfYear')['Weekly_Sales'].mean()
weekly_sales_2012 = merged[merged.Year==2012].
 ↪groupby('WeekOfYear')['Weekly_Sales'].mean()

plt.figure(figsize=(22, 8))
plt.plot(weekly_sales_2010.index, weekly_sales_2010.values, 's-b')
plt.plot(weekly_sales_2011.index, weekly_sales_2011.values, 'o-r')
plt.plot(weekly_sales_2012.index, weekly_sales_2012.values, '*-g')

plt.xticks(np.arange(1, 53, step=1), fontsize=16)
plt.yticks( fontsize=16)
plt.xlabel('Week of Year', fontsize=20, labelpad=20)
plt.ylabel('Sales', fontsize=20, labelpad=20)

plt.title("Average Weekly Sales - Per Year", fontsize=24)
plt.legend(['2010', '2011', '2012'], fontsize=20)
```

[ ]:
```
<matplotlib.legend.Legend at 0x2da67850820>
```



[ ]:
```
store_sales_2010 = merged[merged.Year==2010].groupby('DMA')['Weekly_Sales'].
 ↪mean().to_dict()
store2010_df = pd.DataFrame(list(store_sales_2010.items()), columns=['DMA',␣
 ↪'AvgSales2010'])

store_sales_2011 = merged[merged.Year==2011].groupby('DMA')['Weekly_Sales'].
 ↪mean().to_dict()
store2011_df = pd.DataFrame(list(store_sales_2011.items()), columns=['DMA',␣
 ↪'AvgSales2011'])

store_sales_2012 = merged[merged.Year==2012].groupby('DMA')['Weekly_Sales'].
 ↪mean().to_dict()
store2012_df = pd.DataFrame(list(store_sales_2012.items()), columns=['DMA',␣
 ↪'AvgSales2012'])

fig = make_subplots(rows=3, cols=1, subplot_titles=("Average DMA Sales 2010",␣
 ↪"Average DMA Sales 2011", "Average DMA Sales 2012"))

fig.add_trace(go.Bar(x=store2010_df.DMA, y=store2010_df.AvgSales2010,),1, 1)

fig.add_trace(go.Bar(x=store2011_df.DMA, y=store2011_df.AvgSales2011,),2, 1)

fig.add_trace(go.Bar(x=store2012_df.DMA, y=store2012_df.AvgSales2012,),3, 1)

fig.update_layout(coloraxis=dict(colorscale='Bluered_r'), showlegend=False,␣
 ↪height=1500) # template='plotly_dark', showlegend=False, height=1500)

fig.update_xaxes(title_text="DMA", row=1, col=1)
fig.update_xaxes(title_text="DMA", row=2, col=1)
fig.update_xaxes(title_text="DMA", row=3, col=1)

fig.update_yaxes(title_text="AvgSales", row=1, col=1)
fig.update_yaxes(title_text="AvgSales", row=2, col=1)
fig.update_yaxes(title_text="AvgSales", row=3, col=1)

fig.update_xaxes(tick0=1, dtick=1)
fig.update_traces(textposition='inside', text = round(DMAsales['Weekly_Sales']/
 ↪1000, 2))
fig.show()
```

0.1 DO NOT RUN THIS CODE - IT WILL CRASH YOUR KERNEL!

[ ]:
```
# fig = px.pie(merged, values = 'Weekly_Sales', names = 'DMA' ,title = 'Weekly␣
 ↪Sales per DMA',  labels = {'DMA':'DMA', 'Weekly_Sales':'Weekly Sales'})
# fig.show()

# fig2 = px.bar(merged, x = 'DMA', y = 'Weekly_Sales', color = 'DMA', title =␣
 ↪'Weekly Sales per DMA')
# fig2.show()
```